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NOTES ON NORTH AMERICAN SPHAGNUM, IX

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The Group Cuspidata Lindberg (Continued)*

21. *Sphagnum Fitzgeraldi* Renauld, 1884. The species was originally accredited exclusively to Renauld, though Cardot later[1] asserted that his name should have been added as joint author. For some time after its discovery and description a romantic halo hung over the plant as having been found on decaying palm-leaves in Florida. In late years it has, however, been collected in a number of localities, especially in Florida, and its habitat does not appear to differ greatly from those of other *Sphagna* in the same region. In fact Warnstorf in 1911[2] denies it species right, though he had earlier[3] figured and described its large spores as something quite unique among *Sphagna*[4]. It is not at all impossible that he is right in his latest verdict that it is hardly more than a form of *S. trinitense* C. M., that is, *S. cuspidatum* var. *serrulatum*. It is certainly a derivative of this phase of *S. cuspidatum* and agrees with it in all its important characters. It belongs, however, to a region which has evolved several independent species, and differs in its general macroscopic appearance and some minor quantitative features in such a way that I do not feel it should be entirely relegated to synonymy without further study in the field. It is for one thing a much softer, more delicate plant than *S. cuspidatum* normally is and is often rather suggestive of some other group. This is particularly true because of the shape of its leaves, which are not so slender and elongated, but short and broad, ovate with broadly truncate apex, or sometimes nearly rectangular. The terminal bud then becomes round or at any rate plumper than in the other forms of *S. cuspidatum*, and is often more suggestive of a delicate form of *S. subsecundum*. It was doubtless for this reason that Warnstorf described it from its Alabama locality as a separate species, *S. Mohrianum* Warnstorf, 1892, which he now however also[5] reduces to a variety of *S. trinitense*. I have seen the type material of *S. Mohrianum* from the National Herbarium at Washington and would

* For Notes on North American Sphagnum.—VIII, see THE BRYOLOGIST **22**: 45–49. Sept. 1919.—Ed.

[1] Répertoire sphagnologique, 295. 1897; cf. Rev. Bryol., XII, 46. 1885.

[2] Pflanzenreich **51**: 218.

[3] Verh. d. bot. Ver. d. Prov. Brandenburg, XXXII, 178, fig. 54–58. 1891.

[4] Cf. also Bot. Gaz., XV, 222f. 1890.

[5] Pflanzenreich **51**: 219. 1911.

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unhesitatingly refer it to *S. Fitzgeraldi*; other specimens in the Mohr herbarium collected at different times in the type locality are *S. subsecundum*. Corresponding to its macroscopic features the leaf-cells will often be found to be shorter and broader than in other forms of *S. cuspidatum*, with more bulging walls, especially on the inner surface, while the chlorophyll cells are more nearly equally exposed on both outer and inner surfaces. The stem-leaves tend to be large and like the branch-leaves. The cortical cells of the stem and the retort-cells of the branches are rather large and thin-walled. None of these characters are, however, sharply marked and all tend to vary more or less in the direction of *S. cuspidatum* var. *serrulatum*. Even the large spores (35 μ or slightly more) with their somewhat irregular sculpturing I cannot entirely correlate with other characters, as I find specimens from Florida apparently otherwise referable to *S. cuspidatum* var. *serrulatum* that show spores quite equal to those of *S. Fitzgeraldi* (35μ). In fact Warnstorf[6] gives the spores of *S. cuspidatum* as 25–35 μ. The spores in *Sphagnum* do not show strongly marked species characters either in size, color or marking. The distinctive sculpturing of those of *S. Fitzgeraldi* was perhaps somewhat illusory, as Warnstorf makes no mention of it in his latest work and I find in a good Florida specimen collected by Rapp only low and rather large warty protuberances, a condition quite intermediate between those of two specimens of *S. cuspidatum* var. *serrulatum* also collected by Rapp in the same general region. Warnstorf's figure is apparently to be interpreted in the same way, as is evident from study of the type material.

The plant is now known from North Carolina,[7] Georgia, Florida and Alabama, which places it clearly as one of the new developments of our southern Atlantic and Gulf coasts. The serrulate forms of *S. cuspidatum* do not elsewhere show similar tendencies and whoever has reasonable scruples about maintaining *S. Fitzgeraldi* as a distinct species must at least give it taxonomic standing as no casual form, but a strongly marked variety of definite range in a region characterized by a number of such independent Sphagnum forms.

22. *Sphagnum Dusenii* Jensen, 1890. This species was first distinguished as var. *majus* of *S. cuspidatum* by Russow in 1865.[8] There is only one clea diagnostic character to separate it from *S. cuspidatum*, viz., the very large pores appearing usually in considerable number on the outer surface of the branch-leaf, a feature entirely foreign to typical *S. cuspidatum*. One wishing to deny the moss species-value could point to the fact that in submerged specimens these pores have a troublesome tendency to reduction and even disappearance with the narrowing of the leaves and their empty cells characteristic of submerged forms. I am convinced, however, that the species is better founded than many others.

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[6] Pflanzenreich **51**: 264. 1911.

[7] The North Carolina locality though not indicated in literature before 1913 shows apparently the oldest collection of this species. The specimen is in the Sullivant Herbarium labeled "*Sphagnum* ? Swamps near Wilmington, N. C., collected by A. Gray, Oct., 1843." It is mixed with fragments, of *S. macrophyllum*.

[8] Beitr. z. Kenntn. d. Torfm. 58.

Its macroscopic appearance is so distinctive that in regions where it occurs it is generally collected, even by collectors not especially familiar with Sphagnum species. These macroscopic features are, as in most cases, easier to recognize than to describe. It shows almost always more of a brown pigmentation than *S. cuspidatum* does, giving a snuff-colored effect, which may be weakened by submergence and lack of exposure to sunlight, but is usually different from the green to washed out whitish of *S. cuspidatum*. With much variation in size it tends to have broader leaves and a more robust appearance than typical *S. cuspidatum*, while its leaves lack the undulations more or less evident in the dried state of var. *Torreyi* of the latter. In fact its general aspect would much sooner lead to confusion with forms of such species as *S. Lindbergii* and *S. pulchrum*, from which however it is more easily separated microscopically. Specimens which seem to lack the characteristic leaf-pores will usually, if looked over carefully, show them to be present, at any rate in some parts of the tuft. They are peculiar not only in their large size, but in the fact that many of them, even if not large enough to occupy nearly the whole width of the empty cell, are at any rate placed quite midway between the walls, not in the corners or elsewhere near either wall, as is usual in Sphagnum species.

The history and distribution of this species in North America I have in considerable part given in a note of several years ago.[9] It was first collected by Peck at Sand Lake, N. Y. in 1867 and called by Austin[10] *S. laricinum* Spruce. Sullivant[11] figured it accurately as an unnamed variety of *S. cuspidatum* and denied its identity with *S. laricinum* Spruce, which has generally been considered a form of *S. subsecundum* in its broader sense. Warnstorf at one time confused *S. Dusenii* with *S. mendocinum*, as will be noted in the discussion of the latter species. Its southern distribution so far as known at present, and it may be regarded as probably final east of the Mississippi, is represented by points in northwestern Connecticut, New York, Michigan, Wisconsin, the Rocky Mt. region of British Columbia, with a station reported from Cape Nome, Alaska.[12] This last station I had not noted in my earlier treatment, but attention was called to it later by Frye.[13] It is possible that west of the Mississippi stations will be found somewhat further southward, but it is not a species extending to the full southern limits of glaciation. It may be looked for in any favorable locality further northward and, though found in very wet places, is by no means confined to the coastal region, but is one of the few species probably more frequent inland. In Europe it extends southward to the Alps and in Asia is known from Siberia.

23. *Sphagnum mendocinum* Sullivant & Lesquereux, 1874. This species was named from Mendocino City or County, California, which represents its type-locality and at the same time the southern limit of its range. It is our

[9] Bryologist, XIX, 37. 1916.
[10] Musci Appalach., 8. 1870.
[11] Icones Muscorum, Suppl., 11, Plate 2. 1874.
[12] Univ. of Calif. Public. in Bot., II, 313. 1907.
[13] Bryologist, XXI, 41. 1918.

only *Sphagnum* endemic to that Pacific coast area distinguished by so many endemic bryophyte species. It has acquired no real synonyms, though several times confused with other species, so by Lesquereux at first with *S. auriculatum* Schimper, a form of *S. subsecundum* in its broad sense.[14] Warnstorf for a time included with it *S. Dusenii*[15] and so accredited it to Europe and other localities where it does not occur. In herbaria he also for a time named specimens of it *S. propinquum* H. Lindberg and *S. annulatum* H. Lindberg. It has however maintained itself and is unquestionably a distinct species.

Its general aspect is suggestive of *S. cuspidatum*, but it more commonly has a peculiar yellowish green color, at least in relatively fresh specimens. Its leaves may also be slightly undulate. Its microscopic features are also mostly those of *S. cuspidatum*. Like *S. Dusenii* it is peculiar in its leaf-pores, having them on the outer surface of the branch-leaves rather numerous in rows near the side-walls of the empty cells. In this respect it resembles *S. subsecundum*. The pores however are rather larger, less strongly ringed and in more irregularly interrupted rows than is normally the case in *S. subsecundum*, though the latter varies greatly. The chlorophyll cells of the branch-leaves in section have not the equal exposure on either surface and the oval, more or less central lumen normally characteristic of *S. subsecundum*, but are of the type of *S. cuspidatum*. The empty cells of the branch-leaves have also the narrower, more elongated form of *S. cuspidatum*. On the other hand the stem-cortex deviates markedly from *S. cuspidatum*, being in section composed of one row of large cells with thin walls, often with a second row partially developed, as is well shown in Sullivant's original figure. This feature shows astonishing agreement with *S. subsecundum* and serves effectually to separate our species from *S. balticum* and *S. annulatum*, with which it shares most of its other microscopic characters. It is perhaps with *S. balticum* that it is most closely related, though it is not easy to convince oneself that it is a direct derivative of any one of the species now existing. The marked difference between the cortical stem-cells of *S. annulatum* (agreeing in this respect with *S. balticum*) and *S. mendocinum* is well brought out by the figures given in juxtaposition by Warnstorf in his comprehensive monograph.[16]

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[14] Evidently Lesquereux did not even later understand *S. mendocinum* adequately. Specimens from his herbarium which I have examined through the kindness of Mrs. Britton show three different specimens collected by Bolander near Mendocino City and referred to *S. auriculatum* and later to *S. mendocinum*, of which only one, the type-specimen, really represents the last species; the others are forms of *S. subsecundum*. The Sullivant herbarium seems to show that Sullivant understood the three specimens correctly. The specimen of the second set of Sull. & Lesq. exsiccati (No. 23. 1865) collected by Brewer in the Sierra Nevada of California issued as *S. auriculatum* and referred to *S. mendocinum* in the original publication of the latter species is also a form of *S. subsecundum*. The inclusion of it is however probably due to Lesquereux, who completed and edited the text of the posthumous work of Sullivant. There is no question as to what Sullivant's plate represents, and this together with the name fixes sufficiently the type. Lesquereux's original conception of *S. auriculatum* was apparently based upon two specimens collected in Sweden by Ångström which are now in the Lesquereux herbarium. They represent clearly enough that form of *S. subsecundum* which Schimper described and figured as *S. auriculatum*.

[15] Bot. Gaz., XV, 222. 1890; Verh. bot. Ver. Prov. Brandenburg, XXXII, 210. 1891.

[16] Pflanzenreich **51**: fig. 44. 1911.

The question of distribution touches the broader question of the limits of a bryologically interesting plant-geographical area. The classical California station was "near Mendocino City" (Bolander). M. A. Howe has also since collected it in Mendocino County. This county represents the southern limit, so far as known at present. Brewer's station from the Sierra Nevada near King's River, evidently in Fresno County farther south and east, is still included by Warnstorf (1911), but the plant is as we have seen, *S. subsecundum*. There is little probability that it extends much, if any, further southward or inland than Mendocino County. Northeastward it has been collected in northern Idaho. In Oregon and Washington it is frequent and apparently characteristic The same is true of Vancouver Island. Its range inland in British Columbia is entirely vague. An *S. alaskanum* Warnstorf occurs in literature as more or less of a *nomen nudum*,[17] only to be finally reduced to synonymy by its author[18] with var. *gracilescens* of *S. mendocinum*. As however he cites no Alaskan locality it must be inferred that the name rested upon some original misunderstanding of the locality in which the specimen was found, and there is no authority to include Alaska in its range, though it may perhaps yet be found that the species extends into the southern panhandle of that territory. The earliest collection of it is probably that of Douglas, a specimen of which in the Mitten herbarium is labeled only "Northwest America."[19] It probably does not fall without the geographical limits otherwise known. *S. cuspidatum* seems to be entirely lacking within its range, while *S. subsecundum* is hardly as common as one might reasonably expect.

The working out of my notes on *S. mendocinum* brings out an interesting additional fact in connection with a species treated before. Some years ago while examining rather hurriedly the Sphagnum specimens of the James herbarium at Harvard University I noted a specimen named *S. cuspidatum* collected by John Macoun at Portage La Loche, Northwestern Territory, in September, 1875, which was irregular and which I thought might be *S. mendocinum*, though the locality undoubtedly lies outside the range of the latter species. Macoun's lists do not record even *S. cuspidatum* from Portage La Loche, but do include *S. recurvum*[20] with several other less closely related species from there. Through the kindness of Mr. M. O. Malte, Honorary Curator of the Ottawa herbarium, I have recently seen the specimen of *S. recurvum*, originally labeled *S. cuspidatum*, from Portage La Loche, collected Sept. 15, 1875. Most of the tuft, including the fruiting plants, is *S. recurvum*, as named. There is a single plant of *S. squarrosum* adhering to the outside of the tuft, while intimately intermixed with the *S. recurvum* is another species, which is evidently the same that I had thought might be *S. mendocinum*. Staining of the leaves and section-

[17] Kryptogamenflora der Mark Brandenburg, I, 356. 1903.

[18] Pflanzenreich **51**: 197. 1911

[19] Cf. also Warnstorf, Pflanzenreich **51**: 197. 1911.

[20] Catalogue of Canadian Plants, VI, 5. 1892. Portage La Loche at latitude 57° N. is, I assume, in the vicinity of Fort La Loche in what is now northern Saskatchewan, not far from the boundary of Alberta.

ing of the stem clears up the identity of the plant, which is undoubtedly *S. obtusum* Warnst. As will be recalled, I had not previously seen specimens of this plant from the North American continent, the only report of it being represented by a stem or two found by Macoun in Ontario and now in the Berlin herbarium. I had seen a specimen of it from Greenland.[21] It will probably be found in greater quantity in British America and Alaska, but it is unlikely that it reaches the United States.

To revert for a moment to *S. recurvum*, I have now a specimen of it from Panama, the first I have seen from North America south of the United States. The specimen is labeled "*S. pulchricoma*," which species I had included among the synonyms of *S. recurvum*, and was collected by Hélion in August, 1912, in the "Bois de Boquote, près David (Prov. de Chiriqui)."

ITHACA, N. Y.

ADVENTURES IN MOSSLAND.— A HUNT FOR DESMATODON LATIFOLIUS (HEDW.) BRID.

JOHN W. BAILEY

Some six years ago, Prof. Holzinger sent me a small package of moss which bore the following legend: "*Desmatodon latifolius* (Hedw) Brid. On trunks of old greasewood bushes, Ellensburg, Wash. (with *Orthotrichum tenellum*, which proves to be *O. sordidum*, with some misgivings). Can Dr. Bailey possibly find a lot of this thing next season?"

Prof. Holzinger possesses the uncanny faculty of often finding things I never send him. Some time ago, in a large package of *Grimmia Muhlenbeckii*, he picked out two little bits which he wrote were *Rhacomitrium Flettii*, and asked me to obtain some for him. This moss was first gathered in the crater of Mt. Rainier. Prof. Frye was contemplating a trip to the summit, so supposing it was plentiful there, I asked him to bring down some of the moss that grew in the steam jets. He collected a pocketful but we found it to be only *Philonotis fontana*. Therefore, when the good Professor asked me to find him *Desmatodon latifolius* I naturally supposed that I was following another will-o-the-wisp.

It was my good fortune to find myself this summer again in Ellensburg and in the vicinity of the place where six years ago I had inadvertently gathered the bit of *Desmatodon* referred to above.

Ellensburg is in a large valley just to the east of the Cascade Mountains. The Yakima River flows through it. It is in an irrigated region and has an altitude of about 1,500 feet. It is an offshoot of the Great American Desert and the flora and fauna of the valley are characteristic of the northern part of the Desert. The location where this bit of *Desmatodon* grew was in a dry farming area adjacent to unbroken land covered with the original growth of greasewood. Last winter had been exceptionally favorable for dry-farming operations. There had been heavy snowfalls on the hills and copious rains in the spring. It seemed an excellent time to find the *Desmatodon* if it were to be found.

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[21] BRYOLOGIST, XVIII, 5. 1915. Through the kindness of Prof. Thaxter I have reexamined the Harvard specimen and find it is also *S. obtusum*.

INDEX TO PLATES AND FIGURES

ERRATA

Page 16, line 20, for *Cephalozilla* read *Cephaloziella.*
Page 25, line 11, for bak d read baked.
Page 25, ine 9 from bottom, for *Teloschistes* read *Theloschistes.*
Page 29, line 4, for *graminicola* read *graminicolus.*
Page 45, line 7 from bottom, for r read for.
Page 68, line 29, for medialsis read MEDIALIS.
Pag 70, line 3, for *natan*; read *natans.*
Page 80, line 2, for *undulatum* read *undulata.*
Page 80, line 11 from bottom, for *Odontochisma* read *Odontoschisma.*
Page 80, line 9 from bottom, for c9llected read collected.
Page 86, line 23, for *Muhlenbeckii* read *Mühlenbeckii.*